

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (currently amended) A heat exchanger panel comprising:

a first panel;

a second panel, said second panel being separate from said first panel;

each of said first and second panels being formed from a high temperature composite material;

said first panel being formed from one of a carbon/carbon composite material and a carbon/silicon carbide composite material and said second panel being formed from one of a carbon/carbon composite material and a carbon/silicon carbide composite material; and

a fluid containment device sandwiched between said first and second panels, said fluid containment device not being ~~attached~~ fastened to either of said first and second panels.

Claims 2 - 5 (cancelled)

Claim 6. (original) A heat exchanger panel according to claim 1, further comprising at least one composite fastener for joining said first panel to said second panel.

Claim 7. (currently amended) A heat exchanger panel ~~according to claim 6,~~ wherein comprising:

a first panel;

a second panel;

each of said first and second panels being formed from a high temperature composite material;

a fluid containment device sandwiched between said first and second panels, said fluid containment device not being fastened to either of said first and second panels;

at least one composite fastener for joining said first panel to said second panel; and

each said composite fastener ~~comprises~~ comprising a shaft formed from a composite material, said shaft having a first bore, a metal sleeve having an orifice for receiving a portion of said shaft and a second bore extending perpendicular to said orifice, and a locking pin which is inserted into said second bore and said first bore for securing said shaft to said metal sleeve.

Claim 8. (original) A heat exchanger panel according to claim 7, further comprising said metal sleeve having an exterior thread and a threaded nut for engaging said exterior thread on said metal sleeve.

Claim 9. (original) A heat exchanger panel according to claim 6, wherein said at least one composite fastener further attaches said heat exchange panel to a substructure.

Claim 10. (original) A heat exchanger panel according to claim 1, further comprising each of said first and second panels having a surface feature on an interior surface to accommodate said fluid containment device.

Claim 11. (original) A heat exchanger panel according to claim 10, wherein said fluid containment device comprises a plurality of tubes and said surface feature on each interior surface comprises a plurality of arched portions.

Claim 12. (original) A heat exchanger panel according to claim 10, wherein said fluid containment device comprises two joined metallic sheets formed to create fluid passages and said surface feature on each interior surface comprises a plurality of arched portions separated by planar portions.

Claim 13. (original) A heat exchanger panel according to claim 10, wherein said fluid containment device comprises a metallic heat exchanger with planar face sheets and said surface feature on each interior surface comprises a planar surface feature.

Claims 14 - 16 (cancelled)

Claim 17. (currently amended) A wall system for use in a propulsion system, said wall system comprising:

at least one heat exchanger panel forming part of a wall of said propulsion system;

said at least one heat exchanger panel having an outer panel and an inner panel;

each of said outer and inner panels being formed from a high temperature composite material;

at least one first bore in said inner panel being aligned with at least one second bore in said outer panel;

at least one fastener extending through said at least one first bore and said at least one second bore; and

a coolant containment device sandwiched between said outer and inner panels.

Claim 18. (original) A wall system according to claim 17, further comprising said coolant containment device not being fastened to either of said outer and inner panels.

Claim 19. (currently amended) A wall system according to claim 17, further comprising a substructure and said at least one fastener ~~for~~ securing said outer and inner panels to said substructure.

Claim 20. (original) A wall system according to claim 19, wherein each said fastener comprises a composite fastener.

Claim 21. (currently amended) A wall system ~~according to claim 19, wherein~~ for use in a propulsion system, said wall system comprising:

at least one heat exchanger panel;

said at least one heat exchanger panel having an outer panel and an inner panel;

each of said outer and inner panels being formed from a high temperature composite material;

a coolant containment device sandwiched between said outer and inner panels;

a substructure and at least one fastener for securing said outer and inner panels to said substructure; and

said at least one fastener ~~has~~ having a shaft formed from a non-metallic material and a first bore in said shaft, a metallic sleeve having an orifice for receiving an end portion of said shaft and having a second bore at an angle relative to said orifice, and a locking pin for joining said shaft to said metallic sleeve, said locking pin being inserted into said first and second bores.

Claim 22. (original) A wall system according to claim 21, wherein said inner panel and said substructure each have a bore for receiving a portion of said shaft.

Claim 23. (original) A wall system according to claim 17, further comprising a plurality of heat exchanger panels and said heat exchanger panels being aligned along a longitudinal axis of said wall system.

Claim 24. (original) A wall system according to claim 17, further comprising a leading edge formed from a composite material.

Claim 25. (original) A wall system according to claim 19, further comprising means for injecting fuel into a space bounded by said wall system.

Claim 26. (previously presented) A wall system according to claim 25, wherein said fuel injecting means comprises a fuel inlet conduit, a manifold connected to said fuel inlet conduit, and a plurality of injection nozzles connected to said manifold.

Claim 27. (original) A wall system according to claim 26, wherein said outer panel has an outer surface with a plurality of openings and each of said injection nozzles extends through said openings and above said outer surface.

Claim 28. (original) A wall system according to claim 26, wherein said outer panel has an outer surface and a plurality of openings and each of said injection nozzles has an outlet flush with said outer surface and aligned with one of said openings.

Claim 29. (previously presented) A wall system for use in a propulsion system, said wall system comprising:

at least one heat exchanger panel;

said at least one heat exchanger panel having an outer panel and an inner panel;

each of said outer and inner panels being formed from a high temperature composite material;

a coolant containment device sandwiched between said outer and inner panels;

a substructure and at least one fastener for securing said outer and inner panels to said substructure;

means for injecting fuel into a space bounded by said wall system;

said fuel injecting means comprising a fuel inlet conduit, a manifold connected to said fuel inlet conduit, and a plurality of injection nozzles connected to said manifold;

said outer panel having an outer surface and a plurality of openings; and

each of said injection nozzles extending to a point just below said outer surface and being aligned with one of said openings.

Claim 30. (original) A wall system according to claim 17, further comprising said outer and inner panels each extending from a point near a leading edge of said wall system to a point near a trailing edge of said wall system.

Claim 31. (previously presented): A wall system according to claim 30, wherein said coolant containment device comprises a plurality of tubular passageways extending parallel to a longitudinal axis of said wall system.

Claim 32. (previously presented): A wall system for use in a propulsion system, said wall system comprising:

at least one heat exchanger panel;

said at least one heat exchanger panel having an outer panel and an inner panel;

each of said outer and inner panels being formed from a high temperature composite material;

a coolant containment device sandwiched between said outer and inner panels;

an inner panel extending from a point near a leading edge of said wall system to a point near a trailing edge of said wall system; and

said outer panel comprising a plurality of axially aligned panels.

Claim 33. (original) A wall system according to claim 17, wherein said inner panel is a discontinuous panel.

Claim 34. (original) A wall system according to claim 17, wherein said inner panel is formed from a plurality of spacers and said coolant containment device comprises a plurality of tubular passages separated by said spacers.

Claim 35. (original) A wall system according to claim 17, wherein said propulsion system comprises a scramjet engine.



Claim 36. (original) A wall system according to claim 17, wherein said propulsion system comprises a rocket engine.

Claim 37. (currently amended) A wall system for use in an air breathing propulsion system comprising:

at least one heat exchanger and a substructure forming a portion of a wall of said wall system;

said at least one heat exchanger having an outer panel formed from a composite material and a coolant containment device bounded by said outer panel; and

means for fastening said outer panel to said substructure.

Claim 38. (original) A wall system according to claim 37, wherein said coolant containment device comprises a plurality of tubular passageways and said heat exchanger further comprises a plurality of spacers between said tubular passageways.

Claim 39. (original) A wall system according to claim 37, further comprising means for injecting fuel into a space bounded by said wall system.

Claim 40. (original) A wall system according to claim 37, wherein said composite material is selected from the group consisting of a carbon/carbon composite material and a carbon/silicon carbide composite material.

Appl. No. 10/058,621  
Amdt. dated May 11, 2004  
Reply to office action of Feb. 11, 2004

Claim 41. (new) A wall system according to claim 37, wherein said fastening means comprises a composite fastener which connects the outer panel to the substructure.